DEPARTMENT OF
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# The Western Rock Lobster Fishery 1978–1979

BY

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PERTH
WESTERN AUSTRALIA

1984

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Department of Fisheries and Wildlife

108 Adelaide Terrace

PERTH

# REPORT

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# THE WESTERN ROCK LOBSTER FISHERY 1978/79

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## I INTRODUCTION

The fishery for the western rock lobster *Panulirus cygnus* is one of the most important single fisheries in Australia and an important export earner for the State. Western Australia produced a record 11 388 tons in 1978/79, out of a total Australian catch of rock lobster of 15 400 tons. The fishery is governed by a complex set of regulations which have been reviewed by Bowen (1971) and Hancock (1981) and which are designed to limit the total fishing effort to acceptable levels and to enforce a legal minimum size. It is thus important to constantly monitor the state of the fishery both to ensure that the fishing effort is remaining within the accepted limits and that the regulations are adequately performing their function of maintaining reasonably stable catches. Inherent in this monitoring of the fishery is a careful examination of fishing practice, gear, etc. which may lead to increases in efficiency which may not be detectable through the usual calculations of fishing effort.

This paper is the eighth of a series of annual reviews of the previous rock lobster season which will discuss fishing practice, catches, effort, mean size and various other factors, a knowledge of which will help towards a better understanding of the status of the fishery.

## II METHODS

Catch and effort data were extracted from figures obtained from fishermens' monthly returns and supplied by the Australian Bureau of Statistics and also from rock lobster research log book data, while mean size information was gathered from measurements made by Departmental Research Staff aboard commercial vessels fishing from Dongara, Jurien, Lancelin and Fremantle. Information on trends in fishing practice was gathered principally from conversation with fishermen at various ports as well as from comments made in research log books.

## III RESULTS

### A. CATCH AND EFFORT DATA

The fishing season extends from 15 November to 30 June and may be subdivided into three distinct phases, viz.(i) the "whites" fishery (George, 1958) which begins suddenly in late November (as pale-coloured newly-moulted rock lobsters leave the shallow reef areas) and arbitrarily finishes on 31 December; and (ii) the "coastal red" fishery which begins on 1 January and ends on 30 June. The season in



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the Abrolhos Islands fishery is restricted to the period 15 March to 30 June.

In fishing seasons prior to 1977/78 both the coastal and the Abrolhos Islands fisheries ended on 14 August. The season was shortened by six weeks in 1977/78 as a conservation measure (Hancock, 1981).

In 1978 the "whites" run commenced in Geraldton on about 24 November and in Jurien and Fremantle on about 25 November.

Catches (kg) and fishing effort (in number of pot lifts) were as follows:

| | | | |
|---|---|---|---|
| "Whites" catch | (15 Nov-31 Dec) | = | 4 188 084 kg |
| "Whites" effort | ( " " " ) | = | 2 907 251 Pot lifts |
| "Coastal Reds" catch | (1 Jan-30 June) | = | 5 643 837 kg |
| "Coastal Reds" effort | ( " " ) | = | 6 659 886 Pot lifts |
| Abrolhos catch | (15 Mar-30 June) | = | 1 555 894 kg |
| Abrolhos effort | ( " " " | = | 1 274 987 Pot lifts |
| Total | | = | 11 387 815 kg |
| Total effort | | = | 10 842 124 Pot lifts |

These figures do not include unrecorded sales (i.e. rock lobsters which are sold for cash, etc. and are not recorded in the fishermens' monthly returns of catches and which totalled approximately 700·000 kg), or the total amateur catch which is estimated at approximately 200 000 kg (Norton, 1981). Figure 1 shows comparative catch, fishing effort, i.e. the number of pot lifts[+] and catch per fishing effort data from previous years.

Catch and effort data from various statistical blocks (Figure 2) are shown in Table 1 with catches expressed in kg weight and fishing effort as number of pot lifts. Table 2 shows catch per pot data for the same statistical blocks. The total fishing effort was 10 842 124 units of fishing effort, 2.3% greater than the 1977/78 season.

## B[*] EXPORTS AND GRADE CATEGORIES

Rock lobster tails processed for export are graded by weight and packed in 11.34 kg cartons. The various grades, together with the percentage of cases packed in each grade for the period November 1978 to June 1979 were as follows:

---

[+] Fishing effort is measured as the number of pot lifts (pulls) recorded by fishermen in their Australian Bureau of Statistics monthly returns. In the annual reports prior to 1977/78 fishing effort was calculated as effective fishing effort by the method of Gulland (1969).

[*] Section B is based on data provided by selected processing establishments from Fremantle to Geraldton.

| Grade | % of Cases |
|---|---|
| A (140 - 179 grams) | 28.1 |
| B (180 - 239 grams) | 39.4 |
| C (240 - 279 grams) | 14.0 |
| D (280 - 359 grams) | 7.6 |
| E (360 - 479 grams) | 5.5 |
| F (480 - 599 grams) | 3.1 |
| G (600 - grams) | 2.4 |

C. MEAN SIZE

Samples of rock lobsters were measured aboard commercial vessels using standard pots with 54 mm escape gaps in four depth categories at various ports. The sample would hence include all commercial size rock lobsters, plus undersize which would have been reduced in number by selection by the escape gap (Bowen, 1963). Mean carapace lengths of males and females in the various depth categories at Fremantle, Lancelin, Dongara and Jurien throughout the fishing season have been compared in Table 3. The many omissions in the table are due to either fishermen not fishing the area in question or to some circumstance (breakdown, etc.) which prevented the data from being collected.

D. NUMBER OF BOATS

The number of boats licensed in Zones A, B, C, D and E to fish for rock lobsters is carefully controlled, though boat owners are able to nominate their choice of fishing area, viz. north or south of 30°S.

| | | |
|---|---|---|
| Number of boats licensed in 1978/79 | = | 801 |
| Number of boats licensed in Zone A | = | 207 |
| Number of boats licensed in Zone B | = | 175 |
| Number of boats licensed in Zone C | = | 403 |
| Number of boats licensed in zone D | = | 7 |
| Number of boats licensed in Zone E | = | 9 |

E. FORECAST OF 1978/79 RECRUITMENT

As a result of very high levels of puerulus settlement in earlier years, recruitment during 1978/79 was very high, resulting in a record commercial catch.

F. INTRODUCTION OF NEW LEGISLATION

The 1978/79 season was again closed six weeks early, viz. 30 June, as a measure to contain fishing effort. The early closure applied to both the Abrolhos Island and coastal fisheries.

Rock lobster fishermen with an authorisation to fish the Abrolhos Zone must now cease fishing operations in coastal areas at the end of February each year. A notice published in the Government Gazette on March 2, 1979 prohibits the leaving of pots in coastal areas between March 1 and March 14 by those fishermen holding an Abrolhos Concession and provides for pots to be left in designated waters at the Abrolhos Islands until March 15. The notice also prohibits Abrolhos Islands Authorisation holders from taking rock lobsters during the period March 1-14 and from taking lobsters outside the Abrolhos area during the period March 15 to June 30 in each year.

Other conditions in the notice were administrative amendments relating to the change of the rock lobster season closure from August 14 to June 30.

Any proposal to store rock lobsters in iced potable water prior to processing will need to be referred to the Director, Department of Fisheries and Wildlife.

The management policy for the Abrolhos Island Reserve was updated and now includes provisions on, accomodation for fishermen, sanitation and rubbish disposal, pets and other animals, landings, guns and the taking of rock lobsters, viz. a person who lives ashore at the Abrolhos Islands including a licensed amateur fisherman, may not take rock lobsters by any method whatsoever except that a licensed professional fisherman may take rock lobsters by means of a rock lobster pot authorised by virtue of a Limited Entry Authorisation to engage in zone A of the West Coast Rock Lobster Fishery.

Information regarding these changes to the legislation governing the rock lobster fishery, as well as the Department of Fisheries and Wildlife's policies on various issues, may be found in the following volumes of the Fishing Industry New Service (F.I.N.S.):

Vol. 11 No. 3 (Dec 1978) pp 54, 57.

Vol. 12 No. 1 (Mar 1979) pp 4, 16, 17.

## G. EFFECTS OF NEW LEGISLATION

The shortening of the season by six weeks in 1977/78 was maintained in 1978/79 (Morgan and Barker, 1984). The total fishing effort increased from 10 595 865 pot lifts in 1977/78 to 10 842 124 pot lifts in 1978/79 (2.3%). However, this increase would have been considerably greater had the season continued through until the old closing date of 15 August. The period 1 July to 15 August had the potential for the greatest growth in fishing effort.

The other changes in the legislation were of an administrative nature and hence had little direct effect on levels of catch and fishing effort.

## H. INNOVATIONS TO BOATS AND GEAR

Data supplied by the Marine and Harbours Department showed that a total of 87 boats were replaced during the period 1 July 1978 to 30 June 1979. In the northern area a total of 47 boats were replaced, these ranged in size from 7.42 metres to 17.67 metres with an average size of 10.81 metres, whilst in the southern area a total of 40 boats were replaced ranging in size from 7.62 metres to 17.80 metres and averaging 12.20 metres in length. The replacement vessels in the northern area tended to be small to medium sized, with medium to large sized vessels in the southern area. During this period there was no increase in the number of vessels replaced during the 1977/78 season. The boat replacements were constructed as follows:

| | WOOD | FIBREGLASS | ALUMINIUM |
|---|---|---|---|
| Fremantle | 10 | 29 | 1 |
| Geraldton | 2 | 35 | 10 |
| | 12 | 64 | 11 |

Data from Research Log Books* showed the following usage of various types of pots by fishermen north and south of 30°S:

| | STICK AND CANE BEEHIVE | BATTEN | STEEL BEEHIVE | STEEL TRAPS |
|---|---|---|---|---|
| North | 9% | 90% | 1% | - |
| South | 61% | 31% | 5% | 3% |

In the southern sector of the fishery, the usage of traps (large steel and wire mesh pots, with side entrances constructed of trawl mesh) continued to increase. There was also a trend, again in the southern area toward the use of larger than normal batten and beehive pots.

During the 1978/79 season, rope shedders, a simple hand operated rope coiling device attached to the pot winch were used on a number of rock lobster boats.

## I. BAIT

Data from Research Log Books showed the following usage of bullock hocks and pieces of cattle hide as holding bait in both northern and southern areas:

| | HOCK | HIDES |
|---|---|---|
| North | 59% | 41% |
| South | 49% | 51% |

* Twenty one percent of skippers voluntarily submitted rock lobster research records during the 1978/79 season.

In the northern area the most popular fish baits used in conjunction with bullock hocks or pieces of cattle hide were Australian herring or ruff (*Arripis georgianus*), Australian salmon heads (*Arripis trutta esper* and *Arripis trutta marginata*), New Zealand salmon heads and pieces of salmon meat (*Arripis trutta trutta*), mullet (*Mugil cephalus*), pilchards (*Sardinops neopilchardus*) and scaly mackerel (*Amblygaster postera*). Similar fish baits, although in a different order of preference, were used, together with hocks or hides in the southern area of the fishery. These fish baits were Australian salmon heads, New Zealand salmon heads and pieces of meat, pilchards, mullet, tuna heads and pieces of tuna meat, scaly mackerel and Australian herring.

Fish bait produced by Southern Ocean Fish Processors continued to be used, together with a large range of locally produced and imported fish baits. Craylure, a prepared rock lobster bait declined in use.

## J. DISTRIBUTION OF FISHING

The distribution of fishing is shown in Table 1. The pattern of fishing does not vary greatly from season to season and is dependent on the density of rock lobsters in the various depth categories. Throughout the season the usual pattern of fishing occurred, i.e. concentrated in the shallows during November and December, followed by deep water potting during the latter part of December, January and February, back to the shallows during the latter part of February, March and April and in mixed depths (mainly shallower), depending on weather and density of rock lobsters, throughout the remainder of the season.

During February and March 1979 a single rock lobster boat worked from South Passage in Shark Bay, later that season another five boats worked from the same anchorage.

## K. AVERAGE NUMBER OF DAYS WORKED PER BOAT PER MONTH

| Month | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. |
|---|---|---|---|---|---|---|---|---|
| Days Worked | 12.5 | 27.5 | 18.8 | 17.3 | 23.2 | 22.9 | 18.4 | 16.0 |

The average number of days worked per boat during November and December was 4.2% up on the 1977/78 season and for the period January to June was 1.5% down on the 1977/78 season.

The average number of days worked per boat per month for 1978/79 season was 19.7, which was the same as the 1977/78 season.

## L. PRICE OF ROCK LOBSTERS

Whole weight price paid to fishermen ranged from $5.00 - $5.50 (cash price) with an average price of about $5.00. The range of prices paid on the New York wholesale market for rock lobster tails were:

| GRADE | $AUST. PER KG |
|---|---|
| 5 - 6 oz (140 - 179 grams) | 16.17 - 17.92 |
| 6 - 8 oz (180 - 239 grams) | 15.10 - 16.09 |
| 8 - 10 oz (240 - 279 grams) | 15.00 - 15.74 |
| 10 - 12 oz (280 - 359 grams) | 15.00 - 15.64 |
| 12 - 16 oz (360 - 479 grams) | 14.31 - 15.14 |
| 16 - 20 oz (480 - 599 grams) | 13.82 - 14.90 |
| over 20 oz (600 - grams) | 13.62 - 14.65 |

## M. MARKET TRENDS AND ECONOMIC FACTORS

The majority (97.2%) of frozen rock lobster tails were again exported to the USA. In 1978/79, the appreciating value of the yen against the $US encouraged some local exporters to forward increasing quantities of A and B grade sized whole cooked rock lobster and live chilled rock lobster to Japan. Inventory holdings in Western Australia were at record levels at the end of the 1978/79 season, mainly as a consequence of high American interest rates and record catches.

American wholesale prices during 1978/79 were generally between one and two dollars higher than the previous year's values mainly as a consequence of strengthening American demand.

Some minor fluctuations in the value of the Australian dollar against the American dollar took place throughout the year depreciating the Australian dollar between 2-3% over the period. However, this fluctuation had little direct impact on local beach prices paid to fishermen.

Record catches and beach prices coupled with buoyant economic conditions in the catching sector of the rock lobster fishery resulted in record prices being paid for rock lobster authorisations on transfer.

Prior to the "whites" during October 1978, prices paid for a rock lobster license authorisation transfer on a per pot basis were generally between $800-$1000. By June 1979, authorisation values had reached a record high of $1 500 per pot, reflecting the buoyant economic state of the fishery and optimism at least in the short term future of the rock lobster fishery.

## N. AVERAGE VALUE PER POT ON POT REDISTRIBUTION

During the season the price increased from about $1 000 to $1 500.

O. SEA WATER TEMPERATURES AND SALINITIES

These have relevance to the behaviour and catch rates of rock lobsters (Morgan, 1974). The average sea water temperature during the rock lobster season (i.e. 15 November to 30 June) at Waterman (aquarium header tank) was 21.4°C, with a maximum of 24.0°C on 28 January 1979 and a minimum of 17.6°C on 27 May 1979. The average salinity during the season at Waterman (aquarium) was 35.42‰ with a maximum of 36.23‰ on 22 January 1979 and a minimum of 34.69‰ on 13 November 1978.

Bottom temperatures and surface salinities in waters of various depths in the Fremantle, Lancelin, Jurien and Dongara areas were collected as part of the monitoring of rock lobster catches (Item B) and are shown in Table 4. Other records are maintained by CSIRO.

P. SPAWNING ROCK LOBSTERS

While most of the breeding females are found in the 20 - 30 fathom range, no variation has been observed in the size at first breeding from one depth category to another, except at Jurien over 30 fathoms (Chittleborough, pers. comm.). Hence the data for December, January and February from all depths with the exception of Jurien over 30 fathoms may be pooled to indicate the size frequency of breeding (i.e. "berried" and mated) females and this has been done in Figure 3. The mean size of breeding females was greater at Fremantle and Lancelin than at either Jurien or Dongara with the mean sizes being 96.0 mm for Dongara, 80.2 mm for Jurien, 103.3 mm for Lancelin and 106.2 mm for Fremantle. By comparison the mean sizes at first breeding (i.e. the smallest carapace length at which 50% have been mated) were found to be 102.2 mm at Fremantle, 96.5 mm at Lancelin and 95.7 mm at Dongara. Insufficient data was available for Jurien.

## IV DISCUSSION

The 1978/79 catch increased by 13% on the 1977/78 season to an all time high of 11 387 815 kg. This high catch was the result of very high puerulus settlement and subsequent high recruitment into the commercial fishery rather than increased fishing effort by fishermen. The actual fishing effort (total number of pot lifts) only increased by 2.3% and the average number of days worked per boat per month remained the same as the previous season.

Buoyant economic conditions prevailed throughout the season with new boat replacements remaining high and the price paid to fishermen for their catches considerably higher than the 1977/78 season. Whilst the price of the more popular lines of bait remained stable this was somewhat offset by a steep increase in the price of fuel.

## V ACKNOWLEDGEMENTS

Measurements on board fishing vessels were performed by Mr G. Lymn and Mr M. Burkett. The information on Market Trends and Economic Factors was provided by Mr P. Rogers of the Department of Fisheries and Wildlife.

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TABLE 1: CATCH (IN KG WEIGHT) AND FISHING EFFORT (IN POT LIFTS) FOR THE 1978/79 ROCK LOBSTER SEASON IN VARIOUS STATISTICAL BLOCKS.

| BLOCK | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 2612 | - | - | - | - | - | - | - | - | - |
| 2613 | - | - | - | 564 (980) | - | 1134 (1152) | 3969 (2900) | 4508 (3045) | 10175 (8077) |
| 2712 | - | - | - | - | - | - | - | - | - |
| 2713 | 8318 (12489) | 41510 (27087) | 25115 (33255) | 25642 (33210) | 40676 (42112) | 53963 (42611) | 37422 (37982) | 35136 (32503) | 267782 (261249) |
| 2714 | 2732 (4473) | 20196 (12474) | 7323 (11538) | 7580 (10123) | 11554 (11208) | 12663 (11498) | 10204 (10918) | 7497 (10500) | 79749 (82732) |
| 2812 | - | - | - | - | - | - | - | - | - |
| 2813 | 640 (945) | 15398 (8286) | 4370 (4548) | 4505 (6096) | 577454 (273193) | 594724 (459848) | 281179 (340358) | 102537 (201588) | 1580807 (1294862) |
| 2814 | 73083 (128198) | 389861 (266887) | 89691 (136886) | 43336 (113219) | 75187 (96516) | 83811 (92577) | 48966 (78494) | 44421 (72020) | 848356 (984797) |
| 2912 | - | - | - | - | - | - | - | - | - |
| 2913 | 1123 (2055) | 10372 (8736) | 1937 (1725) | 1364 (2121) | 6285 (4638) | 17047 (9111) | 7145 (8199) | 2416 (3300) | 47689 (39885) |
| 2914 | 249903 (302612) | 948574 (594825) | 246895 (297574) | 141498 (269743) | 285057 (269342) | 280795 (247438) | 132012 (191544) | 86243 (154832) | 2370977 (2327910) |
| 3012 | 206 (1764) | - | - | - | 1776 (2250) | - | - | - | 1982 (4014) |
| 3013 | - | - | - | - | - | - | - | - | - |
| 3014 | 101449 (137805) | 690094 (325746) | 294406 (239757) | 129081 (178435) | 224252 (275169) | 212517 (221793) | 89193 (156196) | 49279 (116024) | 1790271 (1650925) |
| 3015 | 29365 (41321) | 198762 (104593) | 79862 (77979) | 39808 (54843) | 63057 (73877) | 47190 (59860) | 16586 (34782) | 5589 (14528) | 480219 (461783) |
| 3112 | - | - | - | - | - | - | - | - | - |
| 3113 | - | - | - | - | - | - | - | - | - |
| 3114 | 8624 (13629) | 63379 (32911) | 70753 (43363) | 31262 (38052) | 56678 (58950) | 30493 (36205) | 4530 (6054) | 4897 (8439) | 270616 (237603) |
| 3115 | 159812 (201863) | 776287 (434447) | 462557 (367157) | 266864 (328268) | 385241 (437884) | 232400 (326637) | 90364 (210207) | 61618 (159257) | 2435143 (2465720) |
| 3212 | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - |
| 3214 | - | 7020 (3294) | 13333 (7446) | 12130 (6756) | 3385 (3525) | 1999 (2622) | 1510 (2910) | 1635 (3168) | 41012 (29721) |
| 3215 | 52899 (59373) | 327221 (173083) | 220431 (134086) | 128475 (131500) | 149108 (161250) | 86202 (112720) | 56059 (79526) | 36820 (57371) | 1058115 (908909) |
| 3314 | 201 (480) | 5073 (3590) | 11207 (7930) | 7684 (7632) | 9236 (7707) | 4774 (4321) | 2362 (2160) | 123 (120) | 40660 (33940) |
| 3315 | 865 (1305) | 4225 (2100) | 8797 (8555) | 6531 (4296) | 8292 (5399) | 9447 (8576) | 11376 (9628) | 13837 (9258) | 63370 (49117) |
| 3414 | - | 892 (880) | - | - | - | - | - | - | 892 (880) |
| TOTAL | 689220 (908312) | 3498864 (1998939) | 1536677 (1371799) | 846324 (1185274) | 1897238 (1723020) | 1669159 (1636969) | 793777 (1171858) | 456556 (845953) | 11387815 (10842124) |

TOTAL CATCH = 11 387 815 KG
TOTAL EFFORT = 10 842 124 POT LIFTS

Effort figures are shown in parenthesis, and catch figures are underlined.

Not included in these catch figures are 6010 kg of Rock Lobsters taken by diving.

These figures are derived from data kindly provided by the Australian Bureau of Statistics, and reflect slightly more intensive editing by the Data Processing Section of the Department of Fisheries and Wildlife.

TABLE 2: CATCH (KG) PER UNIT OF FISHING EFFORT (I.E. KILOGRAM OF ROCK LOBSTERS PER POT LIFT) DATA FOR 1978/79 SEASON IN VARIOUS STATISTICAL BLOCKS (SEE FIGURE 2).

| BLOCK | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| 2612 | * - | - | - | - | - | - | - | - | - |
| 2613 | - | - | - | 0.58 | - | 0.98 | 1.37 | 1.48 | 1.26 |
| 2712 | - | - | - | - | - | - | - | - | - |
| 2713 | 0.67 | 1.53 | 0.76 | 0.77 | 0.97 | 1.27 | 0.99 | 1.08 | 1.03 |
| 2714 | 0.61 | 1.62 | 0.63 | 0.75 | 1.03 | 1.10 | 0.93 | 0.71 | 0.96 |
| 2812 | - | - | - | - | - | - | - | - | - |
| 2813 | 0.68 | 1.86 | 0.96 | 0.74 | 2.11 | 1.29 | 0.83 | 0.51 | 1.22 |
| 2814 | 0.57 | 1.46 | 0.66 | 0.38 | 0.78 | 0.91 | 0.62 | 0.62 | 0.86 |
| 2912 | - | - | - | - | - | - | - | - | - |
| 2913 | 0.55 | 1.19 | 1.12 | 0.64 | 1.36 | 1.87 | 0.87 | 0.73 | 1.20 |
| 2914 | 0.83 | 1.59 | 0.83 | 0.52 | 1.06 | 1.13 | 0.69 | 0.56 | 1.02 |
| 3012 | 0.12 | - | - | - | 0.79 | - | - | - | 0.49 |
| 3013 | - | - | - | - | - | - | - | - | - |
| 3014 | 0.74 | 2.12 | 1.23 | 0.72 | 0.81 | 0.96 | 0.57 | 0.42 | 1.08 |
| 3015 | 0.71 | 1.90 | 1.02 | 0.73 | 0.85 | 0.79 | 0.48 | 0.38 | 1.04 |
| 3112 | - | - | - | - | - | - | - | - | - |
| 3113 | - | - | - | - | - | - | - | - | - |
| 3114 | 0.63 | 1.93 | 1.63 | 0.82 | 0.96 | 0.84 | 0.75 | 0.58 | 1.14 |
| 3115 | 0.79 | 1.79 | 1.26 | 0.81 | 0.88 | 0.71 | 0.43 | 0.39 | 0.99 |
| 3212 | - | - | - | - | - | - | - | - | - |
| 3213 | - | - | - | - | - | - | - | - | - |
| 3214 | - | 2.13 | 1.79 | 1.80 | 0.96 | 0.76 | 0.52 | 0.52 | 1.38 |
| 3215 | 0.89 | 1.89 | 1.64 | 0.98 | 0.92 | 0.76 | 0.72 | 0.64 | 1.16 |
| 3314 | 0.42 | 1.41 | 1.41 | 1.01 | 1.200 | 1.10 | 1.09 | 1.03 | 1.20 |
| 3315 | 0.66 | 2.01 | 1.03 | 1.52 | 1.54 | 1.10 | 1.18 | 1.49 | 1.29 |
| 3414 | - | 1.01 | - | - | - | - | - | - | 1.01 |
| TOTAL | 0.76 | 1.75 | 1.12 | 0.71 | 1.10 | 1.02 | 0.68 | 0.54 | 1.05 |

* -= NO RECORD OF FISHING

TOTAL CATCH = 11 381 815

TOTAL EFFORT = 10 842 124

TABLE 3: MEAN CARAPACE LENGTHS (MM) OF MALE AND FEMALE ROCK LOBSTERS IN VARIOUS DEPTH CATEGORIES AT FREMANTLE, LANCELIN, JURIEN AND DONGARA THROUGHOUT THE FISHING SEASON.

| | | | 0-10 fms | | 10-20 fms | | 20-30 fms | | 30+ fms | |
|---|---|---|---|---|---|---|---|---|---|---|
| YEAR | AREA | MONTH | MALE | FEMALE | MALE | FEMALE | MALE | FEMALE | MALE | FEMALE |
| 1978/79 | FREMANTLE | NOV | 75 | 72 | 79 | 75 | | | | |
| | | DEC | 81 | 78 | 83 | 80 | | | 95 | 90 |
| | | JAN | 75 | 74 | | | 104 | 91 | 97 | 89 |
| | | FEB | 78 | 75 | | | 98 | 97 | | |
| | | MAR | 77 | 73 | 87 | 80 | 103 | 93 | 104 | 92 |
| | | APR | 77 | 74 | 74 | 73 | 88 | 86 | | |
| | | MAY | 79 | 76 | 96 | 91 | 100 | 87 | | |
| | | JUN | 78 | 74 | 108 | 95 | 95 | 88 | | |
| 1978/79 | LANCELIN | NOV | 75 | 72 | 78 | 74 | | | | |
| | | DEC | | | 92 | 85 | 107 | 89 | | |
| | | JAN | 73 | 71 | 78 | 74 | | | | |
| | | FEB | 72 | 69 | 90 | 83 | 98 | 93 | | |
| | | MAR | | | 80 | 77 | 96 | 92 | | |
| | | APR | 74 | 73 | 76 | 77 | 100 | 94 | | |
| | | MAY | 76 | 73 | | | | | | |
| | | JUN | 74 | 73 | | | | | | |
| 1978/79 | JURIEN | NOV | 75 | 73 | | | | | | |
| | | DEC | 80 | 77 | 81 | 77 | | | | |
| | | JAN | 75 | 73 | 75 | 73 | | | 92 | 82 |
| | | FEB | 74 | 71 | 72 | 69 | | | | |
| | | MAR | 75 | 73 | 78 | 75 | 92 | 85 | | |
| | | APR | 77 | 73 | | | 92 | 85 | | |
| | | MAY | 77 | 73 | 79 | 76 | | | | |
| | | JUN | 75 | 73 | | | | | | |
| 1978/79 | DONGARA | NOV | 75 | 73 | 78 | 76 | | | | |
| | | DEC | 81 | 76 | 81 | 78 | 85 | 80 | | |
| | | JAN | 74 | 71 | | | | | 88 | 87 |
| | | FEB | 71 | 66 | 78 | 75 | 87 | 93 | | |
| | | MAR | 75 | 74 | 78 | 76 | | | 92 | 85 |
| | | APR | 76 | 73 | | | 89 | 86 | 102 | 90 |
| | | MAY | 71 | 68 | | | | | | |
| | | JUN | 73 | 68 | 76 | 73 | | | | |

TABLE 4: BOTTOM TEMPERATURE ($^{o}$C) AND SURFACE SALINITY IN PARTS PER THOUSAND FOR FREMANTLE, LANCELIN, JURIEN AND DONGARA OF WATERS BETWEEN VARIOUS DEPTH CONTOURS FOR THE 1978/79 SEASON

| AREA | DEPTH FATH. | NOV | | DEC | | JAN | | FEB | | MAR | | APR | | MAY | | JUN | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | TEMP | SAL | TEMP | SAL | TEMP | SAL | TEMP | SAL | TEMP | SAL | TEMP | SAL | TEMP | SAL | TEMP | SAL |
| FREMANTLE | 0-10 | 20.6 | 36.04 | 20.1 | 35.82 | 21.0 | 36.53 | 23.8 | 36.79 | 22.5 | 36.16 | 21.2 | 36.23 | - | 35.75 | 18.2 | 35.50 |
| | 10-20 | 20.4 | 35.70 | 20.1 | 35.78 | | | | | | | 21.2 | 35.79 | 19.6 | 35.84 | 19.0 | 35.51 |
| | 20-30 | | | | | | | - | 35.88 | | | 21.0 | 35.78 | 20.6 | 35.80 | 19.8 | 35.50 |
| | 30+ | | | 20.1 | 35.73 | - | 35.68 | | | 21.4 | 35.66 | | | | | | |
| LANCELIN | 0-10 | 20.4 | 35.70 | | | 22.6 | 36.37 | 23.6 | 36.45 | | | | 35.84 | - | 35.43 | 20.5 | 35.53 |
| | 10-20 | 20.2 | 34.81 | 20.0 | 35.98 | 22.8 | 36.24 | 23.4 | 35.91 | 21.8 | 35.98 | 21.0 | 35.75 | | | | |
| | 20-30 | | | 20.2 | 35.93 | | | 22.8 | 35.88 | 21.6 | 36.79 | 21.0 | 35.78 | | | | |
| | 30+ | | | | | | | | | | | | | | | | |
| JURIEN | 0-10 | 21.7 | 36.28 | 22.0 | 36.00 | 22.0 | 36.44 | 22.7 | 36.50 | 22.6 | 36.01 | 22.1 | 35.90 | 20.6 | 35.53 | - | 35.50 |
| | 10-20 | | | 21.9 | 35.90 | 22.0 | 36.52 | 23.1 | 36.48 | 22.2 | 35.86 | | | 20.2 | 35.53 | | |
| | 20-30 | | | | | | | | | - | 36.01 | 22.1 | 35.56 | | | | |
| | 30+ | | | | | - | 36.52 | | | | | | | | | | |
| DONGARA | 0-10 | 21.2 | 36.30 | 21.2 | 35.85 | | | 23.4 | 36.56 | 22.8 | 36.04 | 22.1 | 36.11 | 19.6 | 35.53 | 19.4 | 35.51 |
| | 10-20 | 20.8 | 36.13 | 21.8 | 36.05 | 22.0 | 35.78 | 23.2 | 35.85 | 22.6 | 36.04 | | | 19.0 | 35.49 | 19.0 | 35.41 |
| | 20-30 | | | 21.0 | 35.58 | | | - | 35.90 | | | 22.2 | 35.66 | - | 35.80 | 19.2 | 35.55 |
| | 30+ | | | | | - | 36.10 | | | 21.4 | 36.04 | 22.0 | 35.73 | | | | |

TEMPERATURES WERE TAKEN USING A PROTECTED REVERSING THERMOMETER AND SURFACE WATER SAMPLES WERE TAKEN AND LATER ANALYSED TO DETERMINE SALINITY.

TABLE 5: 1978/79 SEX RATIO BY MONTH AND DEPTH CATEGORY, FIGURES ARE % OF FEMALES IN THE TOTAL SAMPLED CATCH.

| AREA | DEPTH RANGE FATH. | NOV | DEC | JAN | FEB | MAR | APR | MAY | JUN |
|---|---|---|---|---|---|---|---|---|---|
| DONGARA | 0-10 | 50 | 63 | 45 | 67 | 61 | 51 | 51 | 62 |
| | 10-20 | 63 | 66 | | 58 | 51 | | | 60 |
| | 20-30 | | 70 | | 78 | | 74 | | |
| | 30+ | | | 73 | | 69 | 71 | | |
| JURIEN | 0-10 | 61 | 65 | 45 | 60 | 54 | 55 | 57 | 56 |
| | 10-20 | | 62 | 52 | 53 | 63 | | 41 | |
| | 20-30 | | | | | 62 | 68 | | |
| | 30+ | | | 71 | | | | | |
| LANCELIN | 0-10 | 57 | | 63 | 50 | | 67 | 63 | 52 |
| | 10-20 | 64 | 71 | 65 | 66 | 57 | 59 | | |
| | 20-30 | | 64 | | 70 | 78 | 82 | | |
| | 30+ | | | | | | | | |
| FREMANTLE | 0-10 | 56 | 65 | 57 | 47 | 58 | 56 | 56 | 60 |
| | 10-20 | 68 | 60 | | | 68 | 55 | 46 | 43 |
| | 20-30 | | | 59 | 63 | 44 | 61 | 60 | 56 |
| | 30+ | | 63 | 60 | | 47 | | | |

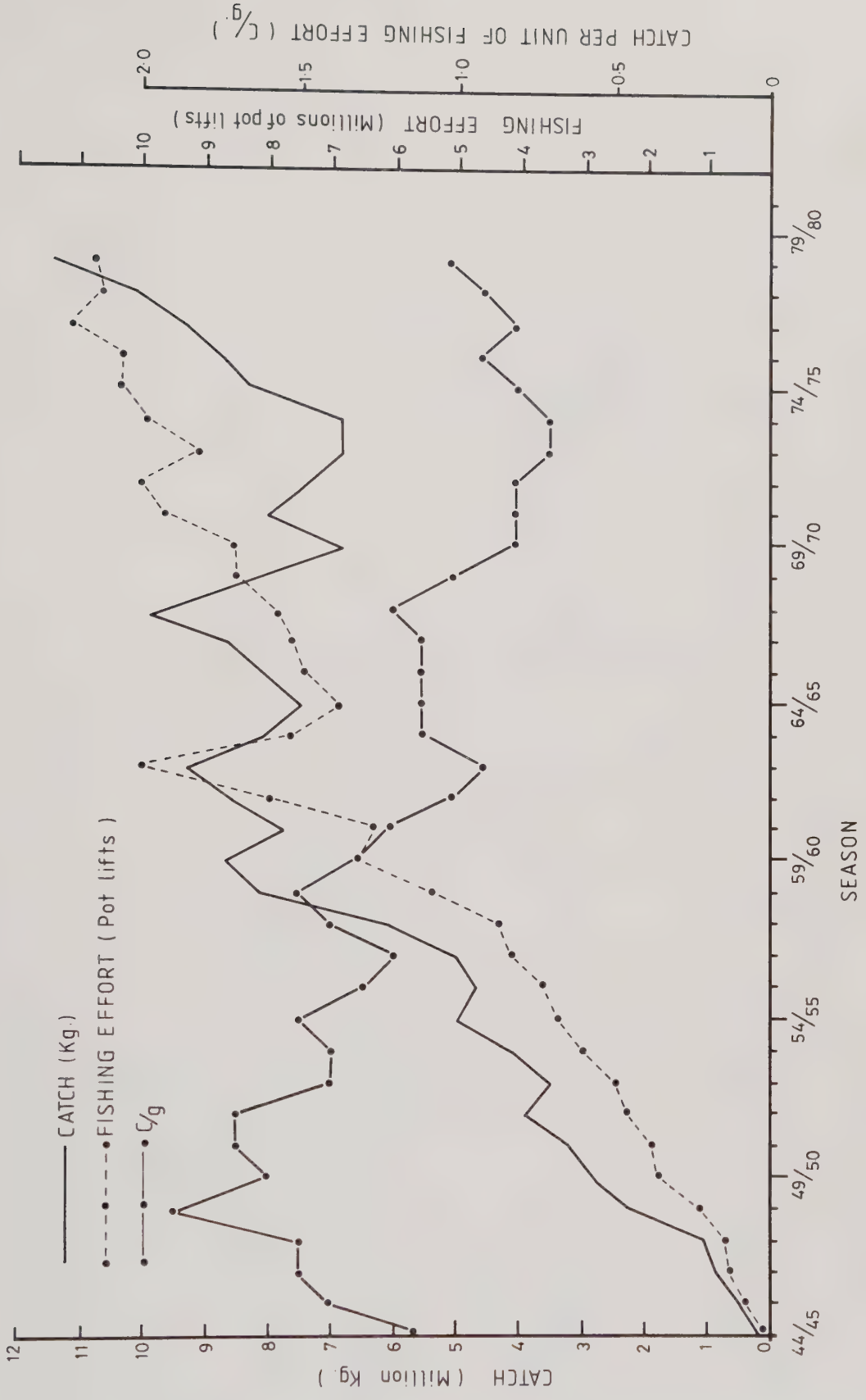


Figure 1. Rock Lobster Catch (kg), Fishing Effort (pot lifts)* and Catch per Unit of Fishing Effort (c/g) Data.

* Prior to the 1977/78 season, fishing effort was calculated as effective fishing effort by the method of Gulland (1969). The complete set of fishing effort data shown here (1944/45 to 1978/79) is obtained as described in the footnote on page 2.

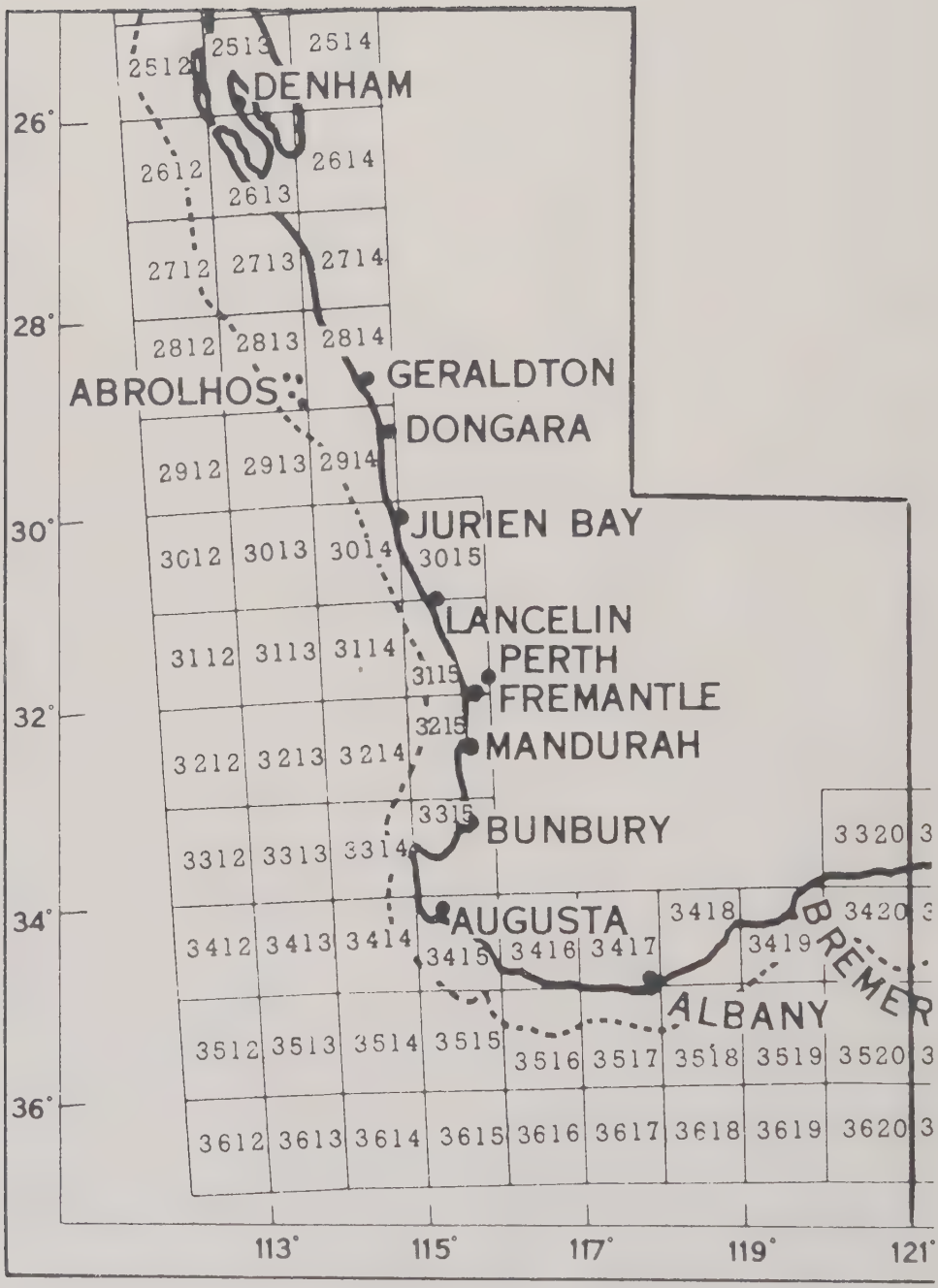


FIGURE 2. Rock Lobster Fishing Areas

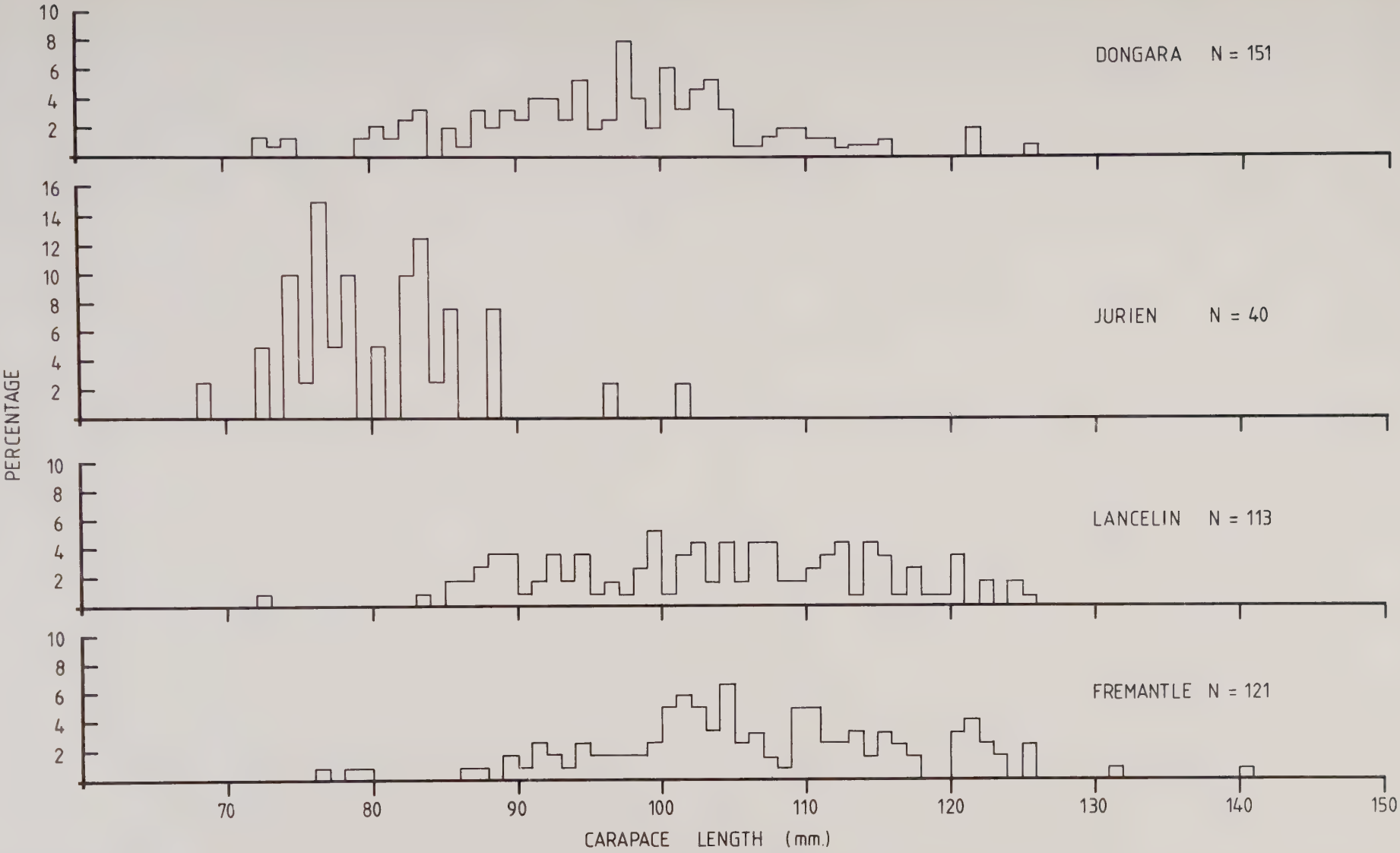


Figure 3. Length frequency of breeding female rock lobsters taken from December 1978 to February 1979.

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